

**DISERTASI**

***TECHNOLOGICAL-MATHEMATICAL KNOWLEDGE FOR TEACHING (T-MKT)***

**UNTUK MEMBANGUN KEYAKINAN MENGAJAR  
MAHASISWA CALON GURU MATEMATIKA SEKOLAH DASAR**

diajukan untuk memenuhi salah satu syarat untuk memperoleh  
gelar Doktor Pendidikan Matematika



oleh

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FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM  
UNIVERSITAS PENDIDIKAN INDONESIA**

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**LEMBAR HAK CIPTA**  
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Sebuah disertasi yang diajukan untuk memenuhi salah satu syarat memperoleh  
gelar Doktor Pendidikan Matematika pada FPMIPA UPI

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Universitas Pendidikan Indonesia  
Agustus 2024

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**UNTUK MEMBANGUN KEYAKINAN MENGAJAR**  
**MAHASISWA CALON GURU MATEMATIKA SEKOLAH DASAR**

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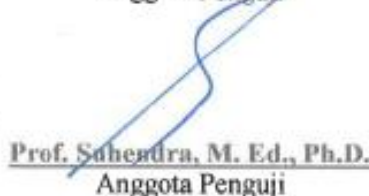
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## PERNYATAAN

Dengan ini saya menyatakan bahwa disertasi dengan judul “*Technological-Mathematical Knowledge for Teaching (T-MKT)* untuk Membangun Keyakinan Mengajar Mahasiswa Calon Guru Matematika Sekolah Dasar” ini beserta seluruh isinya adalah benar-benar karya saya sendiri. Saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika ilmu yang berlaku dalam masyarakat keilmuan. Atas pernyataan tersebut, saya siap menanggung resiko/sanksi apabila dikemudian hari ditemukan pelanggaran etika keilmuan dan klaim dari pihak lain terhadap keaslian karya saya ini.

Bandung, Agustus 2024  
Yang membuat pernyataan

Andhin Dyas Fitriani

## KATA PENGANTAR

Segala puji syukur dipanjatkan kehadirat Allah SWT, atas limpahan rahmat dan hidayahNya, penulis dapat menyelesaikan disertasi ini. Disertasi ini merupakan salah satu persyaratan yang harus dipenuhi untuk memperoleh gelar Doktor Pendidikan Matematika pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam Universitas Pendidikan Indonesia. Disertasi ini berjudul “*Technological-Mathematical Knowledge for Teaching (T-MKT)* untuk Membangun Keyakinan Mengajar Mahasiswa Calon Guru Matematika Sekolah Dasar”. Penulis berharap disertasi ini dapat memberikan manfaat bagi pengembangan pendidikan. Namun demikian, penulis menyadari bahwa disertasi ini masih jauh dari sempurna, oleh karena itu, kritikan dan saran yang konstruktif sangat penulis harapkan.

Akhirnya, penulis mengucapkan terima kasih kepada segenap pihak yang telah membantu dalam penyusunan disertasi ini.

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## UCAPAN TERIMA KASIH

Segala puji syukur dipanjatkan kehadirat Allah SWT, atas limpahan rahmat dan hidayahNya, penulis dapat menyelesaikan disertasi ini. Disertasi ini merupakan salah satu persyaratan yang harus dipenuhi untuk memperoleh gelar Doktor Pendidikan Matematika Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam Universitas Pendidikan Indonesia. Disertasi ini berjudul “*Technological-Mathematical Knowledge for Teaching (T-MKT)* untuk Membangun Keyakinan Mengajar Mahasiswa Calon Guru Matematika Sekolah Dasar”.

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Bandung, Agustus 2024

Penulis,

Andhin Dyas Fitriani

## ABSTRAK

Penguasaan pengetahuan matematika dan ketrampilan untuk mengajar matematika merupakan kompetensi yang perlu dimiliki oleh guru yang pada penelitian ini disebut dengan *mathematical knowledge for teaching* (MKT), yang dibangun sejak menjadi mahasiswa calon guru khususnya mahasiswa calon guru matematika sekolah dasar (MCGMSD). Pelibatan penguasaan teknologi pada pembelajaran matematika pada saat ini juga menjadi kompetensi lain yang perlu dikembangkan. Pada proses yang terjadi, ketiga pengetahuan tersebut perlu terus dikembangkan, dan menjadi capaian lulusan utama bagi MCGMSD. Oleh karena itu, penelitian ini bertujuan untuk meninjau bagaimana kedua pengetahuan tersebut dikembangkan oleh MCGMSD pada pembelajaran matematika sekolah dasar. Penelitian ini menitikberatkan pada desain penelitian studi kasus ganda, untuk lebih menyelidiki siklus pembelajaran matematika yang dilakukan oleh MCGMSD. Subjek penelitian ini adalah MCGMSD yang menempuh mata kuliah pendalaman materi matematika dan mata kuliah pengembangan materi matematika dari perguruan tinggi di kota Bandung sebanyak 18 mahasiswa yang dikelompokkan menjadi empat kategori. Empat kasus (yang masing-masing diwakili oleh dua MCGMSD dengan karakteristik yang sama) dibangun berdasarkan hasil MKT dan pengetahuan teknologi yang dijarang dari mata kuliah yang bersesuaian. Kasus yang dibangun mencakup guru yang: pengetahuan MKT tinggi dan pengetahuan teknologi tinggi, pengetahuan MKT tinggi dan pengetahuan teknologi sedang, pengetahuan MKT sedang dan pengetahuan teknologi tinggi, pengetahuan MKT sedang dan pengetahuan teknologi sedang. Data dikumpulkan melalui instrumen tes *subject matter knowledge*, wawancara, observasi, angket dan studi dokumentasi. Pengolahan data yang dilakukan menggunakan analisis tematik. Hasil penelitian ini menunjukkan bahwa (1) *subject matter knowledge* muncul dengan ditandai dari beberapa indikator dari ketiga komponennya; (2) terdapat empat komponen utama yang muncul dari MCGSD yaitu *knowledge of content and teaching*, *knowledge of contents and students*, *knowledge of curriculum*, dan *technological knowledge*, dengan tingkat penguasaan teknologi cenderung pada tahap *exploring*; (3) pengetahuan teknologi apabila ditinjau dari TMKT menunjukkan tiga komponen yaitu *specialized content knowledge with technology*, *knowledge of content and teaching with technology*, dan *knowledge of content and student with technology*; (4) konsepsi tentang tujuan melibatkan teknologi dalam pembelajaran matematika meliputi visualisasi, penyederhanaan, pemaknaan konsep, dan motivasi. Pelaksanaan praktek pembelajaran yang luas menjadi salah satu tindak lanjut yang direkomendasikan pada penelitian ini.

**Kata Kunci:** *Mathematical knowledge for teaching*, Penguasaan Teknologi, Keyakinan Mengajar MCGMSD



## ABSTRAK

Mastery of Mathematical knowledge and skills for teaching mathematics is a competency teachers need to have, which in this research is called mathematical knowledge for teaching (MKT), which is built when they become student teachers, especially prospective elementary school mathematics teachers (MCGMSD). Involving mastery of technology in mathematics learning is another competency that needs to be developed. In the process that occurs, two types of knowledge need to be continuously developed and become the main graduate achievements for MCGMSD. Therefore, this research will review how MCGMSD develops these MKT and technology knowledge in elementary school mathematics learning. This research focuses on the research design of multiple case studies, to further investigate the mathematics learning cycle carried out by MCGMSD. The subjects of this research were MCGMSD who took courses in deepening mathematics material and developing courses in mathematics material from universities in the city of Bandung as many as 18 students who were grouped into four categories. Four cases (each represented by two MCGMSD with the same characteristics) were built based on the results of the three pieces of knowledge collected from the corresponding courses. The cases constructed include teachers who: have high MKT knowledge and high technological knowledge, high MKT knowledge and moderate technological knowledge, moderate MKT knowledge and high technological knowledge, moderate MKT knowledge and moderate technological knowledge. Data was collected through subject matter knowledge test instruments, interviews, observations, questionnaires, and documentation studies. Data processing was carried out using thematic analysis. The results of this research show that (1) subject matter knowledge emerges as characterized by several indicators from its three components; (2) four main components emerge from MCGSD, namely knowledge of content and teaching, knowledge of contents and students, knowledge of curriculum, and technological knowledge, with the level of technological mastery tending to be at the exploration stage; (3) technological knowledge when viewed from TMKT shows three components, namely specialized content knowledge with technology, knowledge of content and teaching with technology, and knowledge of content and students with technology; (4) the conception of the purpose of involving technology in mathematics learning includes visualization, simplification, understanding of concepts, and motivation. Implementing extensive learning practices is one of the recommended follow-up actions in this research.

**Keywords:** *Mathematical knowledge for teaching*, technological knowledge, teaching belief of prospective primary school mathematics teacher

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